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Determination of Failure Cause in Remanufacturing

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Abstract

Remanufacturing is a series of processes which makes the old product functionally equivalent and visually indistinguishable from a new product. In this research, we analyzed characteristics of target product (power steering oil pump of vehicle) and designed a new algorithm which let us know the cause process of possible failures that can be occurred after remanufacturing. Problems of remanufacturing process were identified by comparing and evaluating the most serious causes deduced by the algorithm which were applied to each failure type.

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Keywords: Remanufacturing; Failure; Cause; Algorithm; Power steering oil pump

1. Introduction

Remanufacturing is a series of processes which makes the old product functionally equivalent and visually indistinguishable from a new product [1][2]. Remanufactured product represents similar performance with new product, but needs only about 10 % of energy to make [3]. Also, it cost only 50~60 % of new product price [4][5]. But it is difficult to increase the market share of remanufactured product because of low consumer awareness [6]. To change the awareness of remanufactured product, we should improve the quality and reduce defect rate of remanufactured product. But under the current production system, some problems were detected in remanufacturing process. So, the purpose of this study is to reduce the failures of remanufactured product through finding the causes of failures.

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In the field of remanufacturing technology, many studies have been done about automobile parts (Table. 1). Paper [7] introduced the strategy for development of remanufacturing industry. Performance evaluation system between new product and remanufactured product was introduced in paper [8]. Paper [9] proposed a systematic guideline for remanufacturing process using the FMEA method in order to estimate the reliability and quality.

Because of intimate relation between each remanufacturing process and failure, it is important to identify the process which causes the failure. So, we designed a new algorithm which let us know the causing process of possible failures that can be occurred after remanufacturing. In this paper, we selected a power steering oil pump of automobile as a research object.

Table 1. Review of the remanufacturing technologies.

References	Contents
H. S. Mok [7]	<ul style="list-style-type: none"> - Identify the status of remanufacturing industry. - Analyse the problems of remanufacturing for automobile parts. - Propose the ways to foster the remanufacturing industry.
N. H. Chung [8]	<ul style="list-style-type: none"> - Failure analysis - Performance Evaluation System - Object : old starter motor
W. Jung [9]	<ul style="list-style-type: none"> - Identify the cause of failure using FMEA - Improvement of remanufacturing process - Object : old alternator

2. Analysis of characteristics and remanufacturing process

2.1. Characteristics of power steering oil pump

This hydraulically operated pump transmits the power to belt so that driver can steer easily at high speed or low speed. Power steering oil pump consists of 56 parts including several fasteners. These were classified into 5 different assembly groups according to their functions. This product is made of several materials. For example, material of main body is aluminum alloy and material of pulley is cast steel.

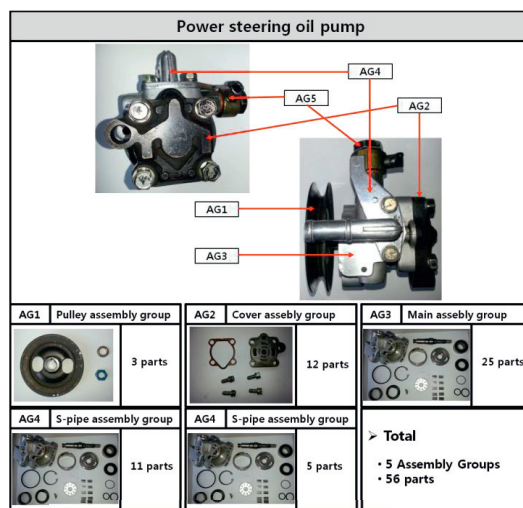


Fig. 1. Research object.

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